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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/079,468	02/19/2002	Christopher M. Fender	399483	6678

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EXAMINER	
WHALEY, PABLO S	

ART UNIT	PAPER NUMBER
1631	

NOTIFICATION DATE	DELIVERY MODE
04/18/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patent@lathropgage.com

Office Action Summary	Application No.	Applicant(s)	
	10/079,468	FENDER ET AL.	
	Examiner	**Art Unit**	
	PABLO WHALEY	1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 January 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 8-34* is/are pending in the application.

4a) Of the above claim(s) *14-19 and 21-34* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4, 8-13, and 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Applicant's arguments, filed 01/28/2011, have been fully considered.

The following rejections and/or objections are either reiterated or newly applied. They constitute the complete set presently being applied to the instant application.

Applicants have amended their claims, filed 01/28/2011, and therefore rejections newly made in the instant office action have been necessitated by amendment.

Status of Claims

Claims 1-4 and 8-34 are pending.

Claims 5-7 have been cancelled. Claims 14-19 and 21-34 are withdrawn.

Claims 1-4, 8-13, and 20 are under consideration.

Claim Rejections - 35 USC § 112, 1st Paragraph

This rejection is withdrawn in view of applicant's amendments filed 01/28/2011.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

> This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2, 4, 8-13 and 20 are rejected under 35 U.S.C. 103(a) as being obvious over Yuhara (Res. Bull. Hokkaido National Agricultural Experiment Station, 1975, No. 111, p.91-100; Japenese Translation Document), in view of Schmitt et al. (Crop Science, 1992; IDS filed 4/7/2003), in view of Rutherford (Journal of Chemical Ecology, 1998, Vol. 24, No. 9, p.1447-1463; IDS filed 04/07/2003), and in view of Hurburgh et al. (WO 00/71993; Published 30 November 2000; IDS filed 05/06/2008).

The claims are drawn to a method for predicting the resistance of a soybean sample to a soybean cyst nematode. For purposes of examination, critical limitations of the claims are interpreted as follows. The method requires (a) obtaining a spectroscopic scan of a soybean sample that has not been infected by a soybean cyst nematode using a spectrometer to provide an assay spectra over a predetermined frequency range; (b) comparing the assay spectra with a predictive model based upon spectra obtained over the predetermined frequency range from individual base samples selected from known soybean cyst nematode resistant genotypes, known soybean cyst nematode susceptible genotypes, and known genotypes with varying levels of resistance to soybean cyst nematode. The comparison between the assay spectra and

the predictive model is conducted by using a discriminate analysis based upon the predictive model, wherein the discriminate analysis includes a regression analysis by comparing peak intensity within the predetermined frequency range between the assay spectra and the corresponding spectra; and (c) predicting the soybean cyst nematode resistance of the soybean sample based upon the comparison results between the assay spectra and the predictive model.

Yuhara teaches a method for detecting soybean cyst nematode (SCN) injury to soybean plants using infrared and multispectral imaging [See pages 1-4 of Japanese Translation Document]. The test system includes taking infrared pictures of soybean samples without soybean cyst nematode inoculation (i.e. controls), as well as with SCN inoculation (i.e. infected), and comparing results [p.2-3, Section 2, Test Methods and Section 3, Test Results], which shows obtaining spectroscopic scans of soybean samples which have not been infected with SCN over a predetermined frequency range; namely the infrared frequency range. Image analysis is performed, comparing spectral data for soybean samples that have not been infected with SCN and those that have been infected by SCN; i.e. soybean cyst nematode susceptible genotypes [Table 1, Table 2, Table 3, Fig. 1]. This spectral data is used to discriminate healthy plants from injured plans [p.5-7], which suggests discriminate analysis based on color intensity. In digital images, color differences between healthy and injured plants was intensified [p.5]. A multispectral camera was used for analyzing spectral scans of soybean leaves for nematode injury [p.4, ¶2 and Fig. 1], which shows obtaining spectroscopic scans using a spectrometer.

Yuhara does not teach inputting data into a predictive model and comparing the assay spectra with a predictive model based upon spectra from individual base samples selected from known soybean cyst nematode resistant genotypes using discriminate analysis that includes a regression analysis, and then predicting SCN resistance based on comparing assay spectra and the predictive model, as in claims 1 and 12.

Rutherford teaches a method for predicting the resistance of sugarcane to *E. saccharina* using NIR spectroscopic scans [Abstract]. In particular, sugarcane samples are obtained over a predetermined frequency range (p. 1449, Near Infrared). Spectral data is analyzed using multiple linear regression analysis with a small number of selected wavelengths (p.1450, ¶3 and ¶4) and the SELECT spectral algorithm is used to construct calibration and validation sets for the predictive model (p.1451, Results, and Table 4) and determine detectable chemical differences indicative of resistance or susceptibility (p.1452, ¶3). The model allows for discrimination based on several different chemical characteristics (Table 1). The calibration sets are used to predict resistance and susceptibility by comparing differences in spectral profiles (p.1454). Prediction results are validated using regression analysis (p.1457-1458 and Fig. 4).

Schmitt teaches standard experimental protocols for classifying soybean cyst nematode resistance in soybean samples [See pages 275-276], which suggests that one skilled in the art would have been aware of methods for detecting chemical differences indicative of SCN resistance or susceptibility. Schmitt also suggests more practical methods for determining resistance other than by race [p.276, Col. 2].

Hurburgh teaches methods for analyzing genetically modified samples and non-genetically modified samples, including soybeans and soybean seeds, using NIR; see for example Abstract and pages 1-2 and 4. All the necessary calibration parameters and reference parameters are disclosed for detecting differences between samples; see pages 5-6.

It would have been obvious to someone of ordinary skill in the art at the time of the instant invention to have obtained spectral data from a soybean cyst nematode resistant genotype sample, in the method of Yuhara, with a reasonable expectation of success, since Schmitt shows how to obtain soybean samples that exhibit SCN resistance, as set forth above, and since Hurburgh shows that NIR can be used obtaining NIR scans of normal or genetically modified samples with predictable results, as set forth above. The motivation would have been to improve analysis by allowing users to do away with complicated wet chemistry techniques; see Hurburgh, page 2.

It would have been obvious to someone of ordinary skill in the art at the time of the instant invention to have used a predictive model being conducted by using discriminate analysis that includes a regression analysis of peak intensity data, in the method of Yuhara, with a reasonable expectation of success, since Yuhara teaches a discriminate analysis model for comparing samples based on spectral data, as above, and since Rutherford teaches a predictive NIR model using regression analysis for correlating data, as above. The motivation would have been to determine resistance ratings of validation sets, as suggested by Rutherford (p.1447, 1457-1458 and Fig. 4).

It would further have been obvious to someone of ordinary skill in the art at the time of the instant invention to have input the data obtained from NIR scans of SCN resistant soybean samples, as made obvious by Schmitt and Hurburgh, into the predictive model made obvious by Yuhara and Rutherford, for predicting SCN resistance of soybean samples, with a reasonable expectation of success, since Yuhara shows a discriminate process for comparing infrared data from non-SCN infected soybean as well as infected SCN-infected soybeans, as above, and since Rutherford shows that resistance of infected plants can be predicted using NIR models over a predetermined frequency range, as set forth above. The motivation would have been to explore more practical methods for determining SCN resistance other than by soybean race, as suggested by Schmitt [p.276, Col. 2], or to provide a remote and low-cost method for predicting resistance [Rutherford, p.1448, ¶5].

Response to Arguments

Applicant's arguments, filed 01/28/2011, that the cited prior art does not teach PREDICTING whether or not a given soybean sample is resistant to SCN infection have been fully considered but are not persuasive for the following reasons.

In response to applicant's argument(s) on page(s) 9-10 that Yuhara does not teach predicting SCN resistant soybean samples, it was acknowledged that Yuhara does not teach this limitation. Yuhara teaches obtaining spectral scans of SCN inoculated and non-inoculated soybean samples, and computational analysis comparing spectral data to identify those infected with SCN. [Table 1, Table 2, Table 3, Fig. 1], which reads on comparing assay spectra with a classification model (i.e. a predictive

model). Applicant is reminded that the rejection is made over a combination of references; arguments directed to the combination are addressed below.

In response to applicant's argument(s) on page(s) 11-12 that Rutherford, Schmitt, and Hurburgh do not teach predicting soybean resistance to SNC infection, Rutherford teaches that one skilled in the art would have been aware of methods for predicting plant resistance to parasites based on spectral data comparisons. While Rutherford does not specifically teach the use of scan from SCN resistance soybean samples, one skilled in the art would have recognized methods for detecting chemical differences in soybeans indicative of SCN resistance or susceptibility, in view of Schmitt, and would have been able to calibrate models for classifying ANY desired plant sample, including soybeans, as normal or genetically resistant based on spectral differences, as suggested by Hurburgh. Therefore, the COMBINATION of Yuhara, Rutherford, Schmitt, and Hurburgh, makes obvious the steps of obtaining spectral scans of SCN resistance soybean samples and predicting SCN resistant samples by comparing assay spectral data. The motivation would have been to explore more practical methods for determining SCN resistance, as suggested by Schmitt [p.276, Col. 2], or to provide a remote and low-cost method for predicting resistance [Rutherford, p.1448, ¶5].

In response to applicant's argument(s) on page(s) 11 that Hurburgh does not teach a correlation between NIR spectra and SCN susceptibility, the claims do not explicitly recite any step for correlating NIR spectral data with SCN susceptibility, but simply require predicting SCN resistance “based upon the comparison results between the assay spectra and the predictive model”. In is noted that the specification [0052]

describes the development of "calibration equations" using NIR data for predicting SCN resistance; however, the claims as written do not recite any such limitations or equations.

In response to applicant's argument(s) on page(s) 12 that the examiner has not provided any evidence why the use of NIR spectra to predict soybean resistance to SCN would have been common knowledge, the claims require “predicting” SCN resistance by comparing assay spectra and the predictive model; the combination of Yuhara, Schmitt, Rutherford, and Hurburgh makes obvious the use of a model for classifying soybeans as resistant or susceptible based on spectral data comparisons, as set forth above, and because the claimed "predictive model" reads on a model for comparing data, as discussed above.

For these reasons, the examiner maintains that the combination of references teaches and/or makes obvious the claimed limitations. As applicant's arguments are not persuasive, and as the applicant has not provided any evidence that the above combination of references could not be predictably combined, this rejection is <u>maintained</u>.

Claims 3 and 9 are rejected under 35 U.S.C. 103(a) as being obvious over Yuhara (Res. Bull. Hokkaido National Agricultural Experiment Station, 1975, No. 111, p.91-100; Japenese Translation Document), in view of Schmitt et al. (Crop Science, 1992; IDS filed 4/7/2003), in view of Rutherford (Journal of Chemical Ecology, 1998, Vol. 24, No. 9, p.1447-1463), and in view of Hurburgh et al. (WO 00/71993; Published 30 November

2000; IDS filed 05/06/2008), as applied to claims 1, 2, 4, 8-13 and 20, above, and further in view of Bewig et al. (JAOCS, 1994, IDS filed 5/1/2007), and in view of Borggaard et al. (Anal. Chem. 1992, 64:545-551).

Yuhara, Schmitt, Rutherford, and Hurburgh make obvious a method of claims 1, 2, 4, 8-13 and 20 for predicting the soybean cyst nematode resistance of a soybean sample, as set forth above.

Yuhara, Schmitt, Rutherford, and Hurburgh do not teach a soybean sample that is a seed, as in claim 3.

Yuhara, Schmitt, Rutherford, and Hurburgh do not teach natural intelligent algorithms as recited in claim 9.

Bewig teaches the use of soybean seed oil in discriminate analysis; see at least Abstract. Oil from soybean seed samples are analyzed using NIR; see page 196 and Fig. 1.

Borggaard et al. teach the use of neural networks for optimally interpreting NIR spectra for classifying samples [Abstract and p. 546, Section I], as in claim 9. More specifically, said neural networks are used to compare results and predict fat in homogenized meat products using NIR spectral data [Table II] and [Fig. 6].

It would have been obvious to someone of ordinary skill in the art at the time of the instant invention to have used a soybean sample that is a seed, as taught by Bewig, in the method made obvious by Yuhara, Schmitt, Rutherford, and Hurburgh, with a reasonable expectation of success, since Bewig shows that soybean seed samples can

be analyzed using NIR with predictable results, as above. The motivation would have been to provide rapid quantification of protein or lipid concentrations in soybeans, for example [p.195, Col. 1].

It would have been obvious to someone of ordinary skill in the art at the time of the instant invention to have used a natural intelligent algorithms for classifying NIR spectral samples, as taught by Borggaard, above, in the method made obvious by Yuhara, Schmitt, Rutherford, and Hurburgh, with a reasonable expectation of success, since the advances of computer technology lends itself to the use of more complex analysis algorithms with predictable results, as suggested by Borggaard; see Introduction. The motivation would have been improve analysis of soybean NIR spectral data by using a learning algorithm that improves predictive power and reduces spectral noise, as suggested by Borggaard (p.550, Section VIII).

Response to Arguments

Applicant's arguments, filed 01/28/2011, that Bewig and Borggaard do not teach PREDICTING whether or not a given soybean sample is resistant to SCN infection for the following reasons have been fully considered but are also not persuasive for the reasons set forth above.

Conclusion

No claims are allowed.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pablo Whaley whose telephone number is (571)272-4425. The examiner can normally be reached between 11am-7pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marjorie Moran can be reached at 571-272-0720. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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